much there is to be seen and learnt in the natural history of the diseases of forest and field and garden plants, and Tubeuf's examples should stimulate botanists to pay more attention to the subject. It is true the reproductions of the photographs are by means of the detestible "process blocks," which disfigure most of the books of the present age; but I suppose we must agree that the choice lies between these or none, as prices and means go.

It will be evident that the book is too large for even a brief review of more than the principal headings, but there are one or two features of importance which stand forth in salient contrast to anything met with in similar works.

These are signs of the times. One of the most striking is the far too meagre note on "selection of hardy varieties"—the word "hardy" does not accurately translate the original. From all sides we are now hearing that different varieties of vines, potatoes, wheat, &c., show different disease-resisting powers, and Tubeuf says, "An important method for the protection of plants from disease . . . consists in the selection and cultivation of varieties and species of plants able to resist the attacks of parasitic fungi."

The very brief account of what has been done with the vine, and the reference to what has been discovered about wheat, will only leave the reader hungry for more information.

In Erikssen and Henning's exhaustive volume on wheat-rust—to which I can discover no reference here, the author confining his remarks to a note they published last year in the *Zeitschrift f. Pflanzenkrankheiten*—the student will find that as matter of fact some varieties of wheat suffer little, and others much from *Puccinia*; and their extended investigations show that no mechanical theory as yet proposed explains this, but that a complex physiological phenomenon is here before us. They also show that the *Puccinia* of wheat-rust also varies, both morphologically and in its physiological relations to the disease. We have, in short, to face the fact that the culture of wheat-rust (for we do cultivate it), as well as the culture of cereals, result in the variation of both fungus and cereal, and it appears that selected varieties of both arise and are propagated.

Such varieties of parasitic fungi are also known in other groups—*e.g. Peridermium*, *Gymnosporangium*, *Ustilago*, &c.—and Tubeuf gives a short note under the respective heads; and we have several indications that physiological races are as common among parasitic fungi as they are among bacteria.

Clearly it is matter for experimental inquiry how far these variations are independent or concomitant, and it may be considered that one of the strongest reasons for encouraging the carrying out of agricultural experiments on a large scale, and the gathering of statistical results, that scientific men can urge, is the hope that more light will be thrown on the relations of these variations, and that we may succeed in utilising the knowledge in the practical evasion of disease. I remember being strongly impressed, in 1880–81, by the varietal differences between the *Hemileia* on coffee and that on *Canthium* in Ceylon, and even then threw out the hint that the former had been derived from the latter; but the comparative immunity of *Coffea Liberica* as contrasted with *C. Arabica*, suggested that it was not impossible that a disease-resisting coffee should be found.

The subject is complex, and bristles with difficulties; but that is no reason for hesitating as to the experimental inquiry; and indeed it has already been commenced in several countries, as the reports from Australia, America and elsewhere show.

Another feature of interest and importance in Von Tubeuf's book, is the chapter on "preventive and combative measures," involving the treatment of diseased plants by means of chemicals. Here, again, I notice a lack of attention to the English literature: Berkeley, and others of our countrymen, had experimented with sulphur in various forms, long before most of the authorities mentioned had taken the matter up. Still, it is quite true, the introduction of Bordeaux-mixture, and its employment on the enormous scales adopted in France, Australia, America and elsewhere, have taught us much, and suggested more. It is a common mistake to suppose that the intelligent application of remedial measures to plant-diseases does not pay—there are plenty of witnesses to the contrary; but, unfortunately, school and university courses generally have allowed of so little attention to the knowledge that must be utilised in carrying out such measures, that even skilled farmers, foresters, and other cultivators of plants, have to enter upon these experiments quite unequipped for carrying them out properly.

Tubeuf's chapter on the "economic importance of diseases of plants" may be cordially—if sadly—recommended to all who are interested in the very necessary extension of technical education by the institution of agricultural schools and colleges. He quotes the losses due to the Californian vine-disease (1892) at 10,000,000 dollars; in 1891 the wheat-rust cost Prussia over 20,000,000*l.*, and Australia something like 2,500,000*l.* Even allowing for large exaggerations—though reports from Sweden, India, Ceylon, the West Indies, and elsewhere suggest similarly large losses from fungus epidemics—in these estimates, it is evident that we have here to deal with annual losses of which even a saving of a very few pounds *per cent.* would be worth consideration; and the comparatively meagre experiments to hand hold out hopes of much more considerable saving, if steps are taken in time, with a due and intelligent knowledge of the problems to be faced, and the methods of facing them.

This must suffice for our review of this excellent book, the technical details of which are well treated, of the highest importance, and abounding with interest to the naturalist and botanist, as well as to the technologist and practical cultivator.

H. MARSHALL WARD.

CAPTAIN LYONS' REPORT ON THE ISLAND OF PHILÆ.

A Report on the Island and Temples of Philæ. By Captain H. G. Lyons, R.E.; with an Introductory Note by W. E. Garstin, C.M.G. (Printed by order of H.E. Hussein Fakhri Pasha, Minister of Public Works in Egypt, 1897.)

THE proposal to build a dam at Philæ, which was brought before the Egyptian Government a few years ago, at the instance of Mr. Willcocks, of the Irrigation Department of Egypt, will be fresh in the memory of many of our readers, even though the details of the somewhat acrimonious discussion upon it which followed in the papers have been forgotten. Briefly, the Egyptian Government had been informed by its English advisers that a better regulated and larger supply of water was needed for agricultural purposes in that part of the valley of the Nile which lies between Aswân and the Mediterranean Sea, and steps were at once taken to find out how that supply could be secured. Mr. Willcocks was ordered to seek out a site where a huge dam could be built for the purpose of holding back the water behind it; and after much thought and careful examination of the various possible sites, he decided that the best place was at Aswân, a few miles to the north of the beautiful little island of Philæ. The announcement of this decision was received with astonishment and outcries, for it needed no expert knowledge to see that the carrying out of the scheme meant, practically, the destruction of the monuments upon the island, and the submerging of both it and the greater part of the buildings upon it for a considerable number of weeks each year. When Mr. Willcocks' scheme was put before the public in its entirety, it was seen that he had indeed contemplated this disastrous result with calmness, and that if his superior officers accepted his report, one of the most picturesque spots in Egypt would be turned into a huge reservoir. Thereupon followed vigorous protests in England and other civilised countries, and at length the characteristic English compromise was proposed. As was to be expected, the usual nonsense was talked and written by the irresponsible person and faddist, and even archæologists signed their names cheerfully at the foot of columns of vehement protests filled with loose statements and inaccuracies. There is no blinking the fact that an attempt was being made to destroy a unique and very lovely bit of scenery, but it must at the same time be remembered that the actual needs of an agricultural population of a country have to be considered, even at the expense of the gratification of the æsthetic sentiments of visitors from other countries. Fortunately, when the dispute was hottest, certain irrigation experts discovered that all practical advantages necessary would be secured to the Egyptian farmer if the height of the water in the proposed reservoir was less than that suggested by Mr. Willcocks, and Mr. Garstin was able to modify the scheme in such a way as to reduce it by about twenty-seven feet. So that if the reservoir is ever built, Mr. Garstin promises us that "the greater portion of the ruins on the island will remain permanently above the submerged level."

Having agreed to adopt a modified scheme for the building of the dam and for the formation of the reservoir, it next became the duty of the Egyptian Government to take steps to see that the monuments *in situ* were not destroyed by the water in which their lower courses must stand, and, as a result, it ordered that the foundations of these structures should be examined and reported upon. To carry out this important work Captain H. G. Lyons was appointed, and the handsome volume before us contains the results of his labours at Philæ during the last two or three years. Without going into details, it must suffice here to say that he has carried out his work conscientiously, and that every person who has ever seen Philæ will accord him his heartiest thanks for the splendid series of photographs and plans of the island which accompany his report. But however interesting these may be, they are relatively of small importance beside the facts concerning the foundations of the buildings on the island which he now makes known to the world, and we feel sure that the minds of many will be much relieved thereby. It has long been known that the architects of ancient Egypt gave their finest buildings but shallow foundations; but that this was not universally the case is proved by the Temple of Isis at Philæ, in which the foundations of the main buildings descend to the bed rock, and many will be surprised to learn that there is as great a depth of masonry below the ground surface as there is height above it.

"Even in the case of the great pylon," Mr. Garstin says, "the depth of the foundation is some five metres; so that the masonry already descends below the level permanently saturated by infiltration, and consequently the conditions of equilibrium of the structure will be unchanged, even should the water-level be very considerably raised."

Along with the examination of foundations, Captain Lyons has effected a considerable number of important repairs, which have been unostentatiously carried out; and if the other measures which he recommends be adopted, it seems probable that little or no danger to the temples will exist, even should the water yearly rise and fall around their bases. This is Mr. Garstin's view of the matter, and, after all, he is the responsible person ultimately. Briefly, if the reservoir be made, much of the quay wall will have to be rebuilt, and the underground spaces between the cross-walls, which support the pavement of the west colonnade, and the crypts of the great Temple of Isis will have to be filled up with rough masonry. The picturesque remains of the Coptic village, at Philæ, must, of course, disappear, because the mud-brick walls will not withstand the action of the water; but archæologists have long ceased to expect to find there any Coptic antiquities of importance, and consequently will not grieve overmuch. Satisfactory as Captain Lyons' report is in all respects, we cannot help feeling that Egyptologists will be disappointed at one result—that is, his failure to find the remains of any building older than the time of Nectanebus, the last native king of Egypt, about B.C. 360. This is, of course, not his fault, but one of the early investigators of Egyptian antiquities, mentioned by Lepsius in his "Letters from Egypt" (London, 1853, p. 525), expressly states that the remains of much earlier buildings were found built into the structures of the Ptolemaïc period. That the Egyptians, before the time of Nectanebus, made no use of the island of Philæ, it is impossible to believe, especially as they built edifices upon the neighbouring island of Biggeh. So far back as B.C. 3500 we know that Egyptian officials passed that way on their road south to bring back pygmies for the royal court at Memphis, and all the gifts and tribute from the south must have been carried into Egypt by that way. In the time of the twelfth dynasty, about B.C. 2500, a body of lightly-armed "runners" was attached to the garrison at Aswân, whose duty it was to guard the cataract, and it is hard to think that Philæ did not form a base for operations at this period. About one thousand years later a temple of Osiris seems to have stood on the island, for a governor of Nubia, called Merimes, cut his name, which is found, along with those of his predecessors and successors, in remembrance of a visit thereto, on rocks on the island of Biggeh (see Brugsch, "Egypt," i. p. 423). In the reign of Rameses II., the builder of the temples at Kalabsheh and Abû Simbel, no mention is made of Philæ, and, curiously enough, no remains inscribed with his prænomen and nomen have been found there. The probable explanation of the silence of the monuments about Philæ is that the island was usually reckoned as a part of Biggeh, and even the Greeks and Romans included both islands in the name of Philæ. Be this as it may, we believe that a temple, or temples, existed at Philæ from the earliest period, and that their remains were removed entirely by those who set up the buildings for Nectanebus and his successors; for, after Captain Lyons' exhaustive survey, it is impossible that any can be found there.

It is now our pleasant duty to call the reader's attention to the series of sixty-seven plates which illustrate Captain Lyons' report, and to fully endorse Mr. Garstin's statement that if the ruins of Philæ were to "disappear to-morrow, the scientific world would still possess a record of each detail of their outline and construction," and we rejoice to hear the promised survey of Nubia has been already begun. Though every intelligent person would view with indignation the slightest damage done unnecessarily to the temples at Philæ, still it must be admitted that antiquarian sentiment should not stand in the way of the prosperity of the country of Egypt. If the scheme of a reservoir at Aswân produces a complete survey of the country for two hundred miles south of it, we may hope that a scheme for a reservoir at Gebel Silsileh will be followed by a complete survey of the country to the north of it. Finally, we congratulate Mr. Garstin and Captain Lyons on the completion of a delicate piece of work, and thank H.E. Hussein Fakhri Pasha for sending forth to the world the results in such a sumptuous form.

ASSAYING IN WORKS LABORATORIES.

Notes on Assaying. By P. de P. Ricketts, E.M., Ph.D., Professor of Analytical Chemistry and Assaying, School of Mines, Columbia University; and E. H. Miller, A.M., Ph.D. of Columbia University. Pp. viii + 311. (New York: John Wiley and Sons. London: Chapman and Hall, Ltd., 1897.)

Recueil de Procédés de dosage pour l'analyse des combustibles, des minerais de fer, des fontes des aciers et des fers. Par G. Arth, Professeur de Chimie Industrielle à la faculté des Sciences de Nancy. Pp. iii + 313. (Paris: G. Carré et C. Naud, 1897.)

THE reissue in a new and enlarged form of Prof. Ricketts' well-known book will be welcomed by all who have used the former editions. As Dr. Miller now assists his chief, the book appears as a new one. It is intended to be used in the laboratories of works where only notes for reference are required, and long and detailed descriptions of well-known operations are unnecessary. The result is that it is written in a crisp and telegraphic style, which should commend itself not only to Americans, but to all busy assayers. On the other hand, students would often require a little supplementary oral teaching to enable them to perform the operations efficiently.

The first part, comprising an account of apparatus, reagents and methods, is good of its kind, although there is little that is new. Regarding litharge, there is a noticeable statement that "it should be free from red oxide of lead, as the latter has the power of oxidising silver and thus causing loss of that metal during the assay." This property, however, is shared by litharge; and it would be interesting if experiments were made showing the relative losses due to the action of the two reagents.

In the part dealing with the fire assays of ores and of bullion, the most interesting sections are those on the assay of gold and silver. The method given of parting the beads from gold ores, by heating them with acid in porcelain crucibles, is seldom used in this country, though it is in general use in America and Australia Its merits are little understood in Great Britain, where it is often adversely criticised. It would appear that no adequate defence of it has yet appeared in print, though it would not be difficult to furnish one. Space forbids any attempt of the kind here. It is sufficient to observe that objections to it have been raised mainly by those who have never tried it, and who do not know how easy it is to obtain exact results by its aid.

The method of assay of gold bullion is described as being that used at the Royal Mint, London, where, the authors imply, the greatest accuracy is obtained. Besides the assay of all metals usually found in ores, an account of qualitative blow-pipe analysis is given, and the whole book is far more complete in its present form than was the case with the previous issues.

M. Arth's book is also one of considerable merit. It is an account of the exact methods of analysis used in iron and steel works in France, and will be useful to the works analyst in all countries. It distinguishes between two kinds of analyses: the one required as a daily control of the works, the other to serve as a basis for experiments or in delicate researches. The rough and ready methods employed for the former purpose are, of course, unsuitable for the latter, and *vice versâ*. Both kinds are described, but the first-named class is undoubtedly the more efficiently treated, the Kjeldahl method for the estimation of nitrogen in fuel being, for example, fully described, and Dumas' method deliberately omitted except by name.

The methods of analysis used in steel works in France do not appear to differ materially from those used in this country, and some which are described were even devised on this side of the Channel. It is evident, therefore, that this book will prove as useful to our analysts as to their colleagues in France.

OUR BOOK SHELF.

Life and Letters of William Barton Rogers. Edited by his Wife, with the assistance of William T. Sedgwick. Vol. i. pp. viii + 427. Vol. ii. pp. vi + 451. (Boston and New York: Houghton, Mifflin, and Co., 1896.)

A TRULY great achievement of the life of William Barton Rogers was the foundation and establishment of the Massachusetts Institute of Technology, which ranks among the best technological schools in the world. His scheme was adopted by a general committee in October 1860, and